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STATISTICAL REPORT ON THE INFLUENZA EPI-
DEMIC AS IT AFFECTED THE POLICYHOLDERS
OF THE MUTUAL LIFE INSURANCE COMPANY
OF NEW YORK IN THE YEAR 1918 ONLY

BY BRANDRETH SYMONDS, M.D.

Chief Medical Director

In compiling the following report on the epidemic of influenza there has constantly arisen the difficulty of finding suitable normal standards with which to make comparisons. Fortunately our recent business beginning with the issues of 1907 has been studied apart from the earlier issue, and quite thoroughly. By using these studies for comparison and by eliminating those influenza deaths which occurred in the issue prior to 1907, it has been possible often to institute fair comparisons, and make reasonable deductions, especially with regard to occupations, medical impairments, etc.

Emphasis must be laid on another point too. Owing to the fact that this epidemic has attacked the young lives particularly, it is not fair to say that any occupation, medical impairments, habits, etc., have affected the mortality from influenza favorably or adversely unless the age-incidence of the group under consideration is known. When the average age of the group is young, there will be many deaths from influenza and vice versa. It is only by analyzing these groups according to age-periods that a right perspective of the effect of the epidemic can be obtained.

EPIDEMIC INFLUENZA

The most striking feature among the causes of death is the great increase due to influenza. Ever since the epidemic which

started in 1890 the company has had a few deaths annually from this disease. The number has varied from 30 to 70 usually, though in 1916 they amounted to 108 deaths. In the whole registration area of the United States the deaths from influenza numbered 18,886 in that year. Early in 1918 reports were received from Europe that influenza had assumed epidemic proportions in the Eastern and Central countries. The accounts were vague owing to difficulties in communication but it finally reached the German army on the Western Front and was recognized as very serious. Soon afterward it appeared in neutral and allied countries, and was given the name of "Spanish Influenza" because it was supposed to have spread from Spain, which it had reached through the medium of German submarines. From the allied countries in Europe it spread to the United States arriving at the New England ports in the early part of September. Thence it diffused with great swiftness over the entire United States, as it is highly communicable, especially in the early stages of the disease. It proceeded along the lines of transportation, invading the cities first but rapidly spreading out into the rural districts. It took only a few weeks to reach the Pacific Coast.

The number of deaths in the United States from influenza directly and indirectly has probably amounted to 700,000 so far, and the epidemic has not yet stopped. It reached a maximum toward the end of October and then subsided distinctly, but the fatalities again rose toward the middle of December. They have passed their second maximum, however, which was considerably lower than the first and are again subsiding decidedly at the date of this writing (Jan. 15, 1919).

Among the company's policyholders there were 37 deaths prior to September due to epidemic influenza. Since that time in the last four months of the year 1918 there have been 1431 deaths among the policyholders in the United States and Canada due to epidemic influenza representing 1643 applications for 1828 policies which amounted to \$4,016,000, so far presented to the company. As the death-claims in the United States and Canada are usually presented promptly, it

is probable that nearly all of those incurred in 1918 have already been filed, but the epidemic is continuing and deaths on account of influenza are being reported throughout January, 1919, though with less frequency. The date on which these deaths occurred is well set forth in the chart which accompanies this report.

The black line shows the incidence according to the date of death, which is recorded on the bottom by weeks, one week to each of the larger spaces. The number of deaths is recorded on the side lines, twenty deaths to each of the larger spaces, and two to each small square. It will be noted that the greatest number of deaths (268) occurred during the week ending Oct. 26th. From that point the deaths declined to 138 in the following week ending Nov. 2d. The number of deaths dropped in the next two weeks though more slowly, as there were 66 deaths in the week ending Nov. 16th. Since then the curve has been a good deal flatter, probably due to the fact that some deaths which occurred late in November or December have not yet been reported to the Company. Of the claims which were ordered paid in 1918, the last recorded death occurred on Dec. 21st. Since Jan. 1, 1919, the influenza claims have not appreciably diminished in number below those of December, 1918. Although the peak of the mortality was apparently reached in the end of October, the epidemic is continuing and has not finished its course.

The red line shows the face amount of the policies which became claims by reason of these deaths from influenza, arranged according to the dates of their deaths. Each large square represents \$50,000 and each small one, \$5000. The maximum amount in any one week was \$732,831 which was incurred in the week ending Oct. 26th, coincident with the maximum number of deaths. Prior to this the amount had gone up rather faster than the deaths, owing to some large policies which were caught early in the epidemic. After Oct. 26th, the red line follows the black line quite closely and the same conclusions apply to it.

The following table shows the distribution of the deaths from

epidemic influenza by ages and policy years. It will be noted that about 76% of the total influenza deaths occurred below 40 years of age. In the first policy year about 93% of the deaths occurred below 40, although the average age at the issue is 28.7 years. In the 2d policy year about 90% occurred below 40. In the 3d to 5th policy years the percentage of deaths below 40 is about 86%. For comparison I have put in the last column the age distribution of all the deaths which occurred in the Company's business in the three years 1915, 1916, and 1917. On comparison it will be seen that the epidemic of influenza is preëminently a disease of the younger ages, about one-third of our deaths occurring below 30, and three-quarters of them below 40, only 128 deaths occurring above 50, a percentage of about 9%.

Epidemic influenza arranged by ages at death and by durations of insurance with the percentages of distribution:

Ages at Death	Total		Policy Year 1		Policy Year 2		Pol.Yrs. 3-5		Pol.Yrs. 6-10		Pol.Yrs. 11-20		Pol.Yrs. 21 & Over		Deaths 1915, 1916 & 1917	
	No.		No.		No.		No.		No.		No.		No.		No.	
	%		%		%		%		%		%		%		%	
Und. 20	26	1.7	15	8.0	5	2.7	6	1.6	..	..	..	..	..	..	..	.3
20-24	118	8.2	29	15.4	25	13.4	47	12.5	17	4.8	..	..	..	..	..	1.7
25-29	310	21.7	59	26.2	60	32.5	105	28.1	88	25.5	7	2.5	..	..	..	2.5
30-34	366	25.6	53	28.2	50	27.1	92	24.7	115	33.4	56	19.7	..	..	..	3.7
35-39	264	18.5	28	14.9	26	14.1	73	19.5	58	16.8	78	27.5	1	1.8	..	5.1
40-44	138	9.6	10	5.3	11	6.0	31	8.3	28	8.1	53	18.7	5	9.1	..	7.3
45-49	81	5.7	2	1.1	5	2.7	14	3.7	21	6.1	30	10.6	9	16.4	..	9.0
50-54	50	3.9	..	..	1	.5	5	1.3	12	3.5	30	10.6	8	14.6	..	10.4
55-59	24	1.7	1	.5	1	.5	1	.3	3	.9	11	3.9	7	12.7	..	12.1
60-64	17	1.2	..	..	1	.5	..	..	1	.3	10	3.5	5	9.0	..	11.0
65-69	16	1.1	..	..	..	..	..	..	1	.3	5	1.7	1	1.8	..	10.0
70-74	7	.5	..	..	..	..	..	..	..	..	..	..	4	7.3	..	7.7
75-79	4	.3	..	..	..	..	..	..	..	..	..	..	4	7.3	..	8.3
80 & Ov.	4	.3	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Total	1431		188		185		374		345		284		55			

In the previous epidemic of influenza, which began toward the end of 1889 and recurred in 1890, 1891, and 1892 and also in subsequent years when it was endemic, influenza affected the older ages. Dr. Elias J. Marsh, our former Medical Director, in his "Report on the Mortality Records of the Mutual Life

from 1843 to 1898," says: "Influenza is a disease of all ages of life but the principal mortality has fallen upon those above middle age, the largest numbers being between sixty and eighty years, as shown in the following table":

INFLUENZA

Age of Death	Number of Deaths	Percentage of Total Deaths
20 to 30 years	13	3.3
30 to 40 years	38	9.7
40 to 50 years	69	17.6
50 to 60 years	71	18.2
60 to 70 years	89	22.8
70 to 80 years	81	20.7
80 to 90 years	27	6.9
90 years & upward	3	.8
Total	391	100.0

It will be noted that more than half, 51.2%, of the deaths occurred over 60 years of age while in the present epidemic only 3.4% occurred above 60, and more than half, 57.3%, occurred below 35. This contrast between the two epidemics is still greater when we realize that the proportion of living policyholders above 60 years of age was much smaller 30 years ago than now.

The following table shows the deaths and losses from epidemic influenza according to the duration of the insurance. For purposes of comparison with normal conditions the percentage of deaths and losses which the Company has incurred in the business issued since 1885 is given in the last column. It will be noted that in the 1st policy year, the deaths from influenza were 1½ times the normal, and the losses were 2½ times the normal. In the 2d policy year the deaths from influenza were more than 1½ times the normal and the losses from influenza nearly 2½ times the normal. On account of this short duration and the comparatively young ages at issue, the accumulated reserve on these policies has been small and the net loss to the Company has been very large.

INFLUENZA DEATHS

Policy Years	Influenza Deaths Reckoned by Applications		Deaths of the Issues of 1885 to 1915
	(1) No.	(2) %	(3) %
1	190	11.6	7.1
2	195	11.8	7.0
3-5	416	25.4	19.1
6-10	418	25.4	26.2
11-20	351	21.4	33.3
21 & Over	73	4.4	7.3
Total	1643	100.0	100.0

INFLUENZA LOSSES

Policy Years	Influenza Losses		Losses of the Issues of 1885 to 1915
	(1) No.	(2) %	(3) %
1	\$630,400	15.7	6.4
2	612,900	15.3	6.9
3-5	948,100	23.6	17.9
6-10	992,000	24.7	24.9
11-20	603,200	15.0	35.5
21 & Over	229,400	5.7	8.4
Total	\$4,016,000	100.0	100.0

The different parts of the United States and Canada seem to have suffered to about the same degree from influenza. It invaded the cities at first and spread rapidly by the ordinary routes of transportation. It soon got into the rural districts

and was probably quite as fatal there as in the cities. The percentage of our policyholders who died in the different States varies somewhat, and this is due in part to small numbers. When the States are grouped in fairly large areas as in the subjoined table these inequalities disappear. Column (1) shows the number of deaths from *influenza* in each group of States, and column (2) the percentage. Column (3) has been introduced for comparison, for the number of our policyholders differs markedly in the different areas. Column (3) shows the percentage of deaths among our policyholders in 1915, 1916, and 1917, who resided in the different areas and is a fair index of the distribution of our policyholders in general. It will be noted that (3) and (2) do not differ greatly in any areas and practically coincide in areas 1, 2, 3, and 4. In areas 5 and 6 the excessive proportion of influenza deaths may be due to a larger percentage of younger policyholders. Besides these 1423 there were seven Americans who died in France of influenza and one who died at sea of influenza.

Epidemic influenza deaths by residence at death, with the percentage of distribution:

Area	States	Influenza Deaths		Deaths during the Years 1915, 1916, and 1917
		(1) No.	(2) %	(3) %
1	New England States, N. Y., N. J., Pa., and Del.	485	34.1	37.4
2	Ohio, Ind., Ill., Mich., Wis., Minn., and Iowa.	277	19.5	20.4
3	Md., D. of C., Va., W. Va., No. Car., Tenn., Ky., and Mo.	205	14.4	13.1
4	So. Car., Ga., Fla., Ala., Miss., Ark., La., Okla., and Texas.	212	14.9	14.1
5	Kans., Neb., No. Dak., and So. Dak.	56	3.9	2.2
6	Idaho, Mont., Colo., Wyo., Utah, Nev., N. Mex., and Ariz.	86	6.7	3.5
7	Wash., Ore., and Cal.	61	4.3	6.9
8	Canada.	31	2.2	2.4
	Total.	1423	100.0	100.0

The influence of weight on the mortality from influenza is set forth in the following table, which is divided into three sections; light weights, medium weights, and heavy weights. At

Ages at Issue	Entrants since 1907	Regular deaths of the entrants since 1907	Influenza deaths of the entrants since 1907	
LIGHT WEIGHT				
	(1) %	(2) %	(3) %	(4) No.
15-29	17.6	19.2	14.2	109
30-39	9.3	10.5	7.7	28
40 & Over	6.2	6.4	2.4	2
MEDIUM WEIGHT				
	(1) %	(2) %	(3) %	(4) No.
15-29	79.4	78.2	78.9	605
30-39	80.1	77.6	71.2	258
40 & Over	76.0	73.2	67.1	57
HEAVY WEIGHT				
	(1) %	(2) %	(3) %	(4) No.
15-29	3.0	2.6	6.9	53
30-39	10.6	11.9	21.1	76
40 & Over	17.8	20.4	30.5	26

height 5 ft. 8, for example, those who weighed 132 pounds or less were counted as lightweights and those who weighed 181

pounds or more were counted as heavy weights. Column (1) shows the percentage of the policyholders who have been insured since 1907 in that age-period in each section. Column (2) shows the percentage of deaths among the policyholders insured since 1907 in each section. It will be noted that in both the lightweight and the heavyweight sections the percentages are higher in (2) than in (1), indicating in a crude way that the mortality is larger than normal in these sections, with the exception of the youngest age-period among the heavyweights. Among the lightweights this excess is due in the main to tuberculosis, but among the heavyweights the acute infectious diseases are quite important in determining the excess in the early policy years. Column (3) shows the percentage of the deaths from *influenza* among the policyholders insured since 1907. That lightweight has been a distinct protection against a fatal termination is shown by the low percentage in column (3). The heavyweights on the other hand show the bad effects of a severe acute infectious disease like *influenza* by the higher percentages in column (3). The *influenza* deaths in the lightweight section numbered 139, in the medium weight section 920, and in the heavyweight section 155.

The effect of *influenza* in the different occupations seems to depend mainly upon the average age of the policyholders in each. If the occupation calls for younger men, the *influenza* mortality of the group as a whole will be high and vice versa. Thus the occupations of druggists, teachers, clerks, and students all show a high mortality from *influenza*, but it is due solely to the fact that these occupations include to a marked degree the younger men. As an example the following table shows the mortality among clerks. It will be noted that the total *influenza* mortality among clerks is more than normal. When the deaths are divided into age-periods, the *influenza* mortality in each age-period is good. It is evident that the high percentage of the total is due only to the large number of *influenza* deaths and this is due to the comparative youth of the class.

CLASS NO. 224—INDOOR CLERKS

Ages at Issue	Entrants since 1907	Regular deaths of the entrants since 1907	Influenza deaths of the entrants since 1907	
	(1) %	(2) %	(3) %	(4) No.
15-29	6.8	14.3	13.5	104
30-39	2.1	4.9	8.8	32
40 & Over	1.0	2.9	2.4	2
Total	9.8	6.5	11.4	138

The mortality among students was particularly high. The deaths were limited to the age-period, 15-29, and even in that period showed a percentage considerably higher than among the regular deaths in this occupation. It was found that nearly one-half of these influenza deaths occurred in camps and cantonments of the Army and Navy where the influenza epidemic was particularly extensive and virulent.

Where the average age of the occupation was rather high, the total influenza mortality was comparatively low as in ministers, bank officials, merchants, contractors, and factory superintendents. When these classes were analyzed by age-periods, the true facts developed and showed that they suffered as much as usual. Farmers and most occupations with an average age-distribution showed about the average results. Among the metal workers and rolling mill employees, the percentage of influenza deaths was high in the total and at all ages, though the deaths were too few to permit any extended analysis.

It is evident that the age-distribution of any class materially affects conclusions as to the frequency of influenza in that class.

The influence of total abstinence on the mortality due to influenza is set forth in the following table. Column (1) next

to the ages shows the percentage of total abstainers among the policyholders of that age who have been insured since 1907. Column (2) shows the percentage of total abstainers among the dead who have been insured since 1907. It will be noted that the percentages in (2) are uniformly lower than in (1), indicating in a crude way that total abstainers have a lower mortality than the other policyholders. This also has been demonstrated by very elaborate analysis in previous studies. Column (3) shows the percentage of total abstainers among those dead of influenza who have been insured since 1907 and who numbered 488. It will be noted that the age-period 15-29 in this column shows a mortality among the influenza deaths which is practically the same as in column (2). The age-periods 30-39 and 40 and over show a slightly higher mortality among the influenza deaths. Total abstinence does not seem to have been of any material help in preventing a fatal termination to influenza at any age.

Ages at Issue	Entrants since 1907	Regular deaths of the entrants since 1907	Influenza deaths of the entrants since 1907	
	(1) %	(2) %	(3) %	(4) No.
15-29	49.4	48.0	47.1	362
30-39	31.7	27.6	29.3	106
40 & over	28.4	23.3	23.6	20

Among those who used alcohol daily but never to excess, influenza did not lead to fatal results in any greater proportion than among the other policyholders. In the following table column (1) shows the percentage of those who drank daily but never to excess among the policyholders insured since 1907, and column (2) shows the percentage of these who have died since 1907. The fact that (2) is uniformly larger than (1) indicates approximately that these risks have a higher mortal-

ity than the average, a fact which has been demonstrated accurately many times. Column (3) shows the percentage of influenza deaths among those policyholders insured since 1907 who drank daily but never to excess. These figures are lower than in (2) and even lower than in (1), showing in a rough way that the daily but not excessive use of alcohol does not conduce to a fatal termination in influenza.

CLASS No. 18—DAILY USER OF ALCOHOL

Ages at Issue	Entrants since 1907	Regular deaths of the entrants since 1907	Influenza deaths of the entrants since 1907	
	(1) %	(2) %	(3) %	(4) No.
15-29	4.9	6.8	4.4	34
30-39	9.1	9.9	6.3	23
40 & over	10.1	11.6	8.3	7
Total	7.4	9.9	5.3	64

Our former Medical Director, Dr. E. J. Marsh, stated that the effect of the previous epidemic of influenza did not end with the deaths from the acute diseases, influenza, pneumonia, and bronchitis but not infrequently lighted up a tuberculosis which terminated fatally after some months and even years. Good authorities hold that the same result will follow in this epidemic. This seems likely on account of the extensive pulmonary involvement which occurs in so many cases. The fact that tuberculosis has occurred in the family, however, does not seem to affect the immediate mortality from influenza. In the following table, column (1) shows the percentage of those policyholders insured since 1907 who had lost one member of the immediate family from tuberculosis, either a parent, a brother, or a sister. Column (2) shows the percent-

age of these who died since 1907. As these percentages are higher than in column (1), especially in age-period 15-29, it gives a rough indication that the mortality is larger than the average in this class. Column (3) shows the percentage of the deaths from influenza in this class. These are lower than in (2) except among those over 40 where the number of influenza deaths amounted only to six. It is fair to infer that one case of tuberculosis in the immediate family does not conduce to a fatal termination in influenza.

CLASSES No. 53 & 55—TUBERCULOSIS IN FAMILY HISTORY, ONE PARENT OR ONE BROTHER OR SISTER DEAD OF

Ages at Issue	Entrants since 1907	Regular deaths of the entrants since 1907	Influenza deaths of the entrants since 1907	
	(1) %	(2) %	(3) %	(4) No.
15-29	3.6	4.9	3.4	26
30-39	5.4	6.2	5.8	21
40 & over	6.9	6.4	7.1	6
Total	4.9	6.0	4.4	53

Different types of blood-pressure seem to have very little effect on the mortality from influenza. Two hundred and fifty-one of the influenza deaths had a record of the blood-pressure at the time of examination. Their distribution, according to the systolic blood-pressure as recorded on millimeters of mercury, is shown in the following table-column (1). For purposes of comparison the same distribution in the deaths among our policyholders who have been insured since 1907 is shown in column (2). The systolic blood-pressures above 135 m. show percentages a little bit lower than the average. This may indicate that a systolic blood-pressure in the upper half of the normal has a favorable influence upon an attack of

influenza but the differences are not large and the number of cases is small.

Systolic Blood-Pressure in millimeters of mercury	Influenza Deaths	Deaths 1907-1915
	(1) %	(2) %
Below 100	1.2	1.1
100-110	8.8	7.9
111-135	71.6	63.9
136-150	17.9	25.0
151-160	.4	1.6

Out of the 1431 deaths from epidemic influenza, 74 occurred among our women policyholders, occasioning losses which amounted to \$118,800. The average amount is low and, furthermore, the influenza deaths are few compared with men, for these influenza deaths among women number only 5% of all the influenza deaths while women are present among our policyholders to the extent of 7½%. The average age of the influenza deaths among women was lower, being 34.73 years, and the average duration was longer, being 7.50 years.

The losses from this epidemic of influenza have been appalling among the life insurance companies in the United States. In 1918 alone the death-claims paid on this account have been calculated to exceed \$100,000,000, a very conservative estimate, and they are continuing right along into 1919. It seems absurd to think that no methods of prophylaxis have been devised to resist this pestilence except those of ordinary sanitation, hygiene, and isolation. The bacillus influenza which was held responsible for the previous epidemic is no longer regarded as an important factor. It is undoubtedly caused by some germ, and the prevailing theory at present is that this germ is so small that it passes through filters and is beyond the vision in the best microscope. The idea is that without causing any definite lesion by itself it lowers the resistance of the tissues

in the individual attacked, so that the ordinary bacterial fauna of the air passages become ravening carnivora with the development of bronchitis and all varieties of pneumonia, and occasionally an overwhelming general toxæmia.

In order to determine whether any vaccine like those which have been so successful against typhoid fever, paratyphoid fever, etc., had proved to be of any value in the prevention of epidemic influenza, I corresponded with the medical referees of the Company. These number 63 in the United States and Canada and are among the leading practitioners of medicine in each city where a managing agency is located. I sent out a circular letter in December and then checked up the results by a telegram in January. Without going into details the result may be summarized briefly as follows:

No one has any faith in a vaccine of the old bacillus influenza, and most of them had no faith in any vaccine. A few had faith in a mixed vaccine which contains the germs causing the different forms of pneumonia and of bronchitis, but the whole matter must be considered very doubtful and the subject of future experience and research. The faith of these was increasing in January as compared with December and was therefore a prophylactic only against the ordinary fatal complications of influenza.

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